

Weed Risk Assessment: *Centaurea calcitrapa*

1. Plant Details

Taxonomy: *Centaurea calcitrapa* L. Family Asteraceae.

Common names: star thistle, purple star thistle, red star thistle.

Origins: Native to Europe (Hungary, Switzerland, Czechoslovakia, Russian Federation, Ukraine, Albania, Greece, Italy, Romania, Yugoslavia, France, Portugal, Spain), Macaronesia (Canary Islands, Madeira Islands), temperate Asia (Cyprus, Lebanon, Syria, Turkey) and North Africa (Algeria, Egypt, Morocco, Tunisia) (GRIN database).

Naturalised Distribution: Naturalised in New Zealand, South Africa, Central America, South America, the United States of America (eg. naturalised in 14 states, mostly in northwest including California, Idaho, Washington, Wyoming, New Mexico, Oregon, Arizona) (USDA plants database), and Australia (GRIN database).

Description: *C. calcitrapa* is an erect, bushy and spiny biannual herb that is sometimes behaves as an annual or short-lived perennial. It grows to 1 m tall. Young stems and leaves have fine, cobweb-like hairs that fall off over time. Older stems are much-branched, straggly, woody, sparsely hairy, without wings or spines and whitish to pale green. Lower leaves are deeply divided while upper leaves are generally narrow and undivided. Rosette leaves are deeply divided and older rosettes have a circle of spines in the centre. This is the initial, infertile, flower head. Numerous flowers are produced on the true flowering stem and vary from lavender to a deep purple colour. Bracts end in a sharp, rigid white to yellow spines. Seed is straw coloured and blotched with dark brown spots. The pappus is reduced or absent. Bristles are absent. Seeds are 3-4mm long, smooth and ovoid. The root is a fleshy taproot (Parsons and Cuthbertson, 2001) (Moser, L. and Crisp, D., undated).

Biological and ecology:

Habitat. *C. calcitrapa* occurs mostly in open, unshaded situations in temperate regions. It is found on a wide range of soils but can grow very well in moist, heavy soils. It has been observed in abundance on fertile soils in the USA and is described as adaptable over a range of climates, generally with rainfall between 700-900 mm per annum. It is found in poorer pastures, on roadsides, around stock-yards and neglected areas (Parsons and Cuthbertson, 2001). In the



USA it is noted as invasive in native vegetation (Graham, University of Nevada website).

Life cycle. *C. calcitrapa* germination occurs mostly after autumn rains but may occur at any time adequate moisture is available. Rosettes form over late winter and spring and a flowering stem emerges in late spring. Sometimes the plant remains a rosette until the following spring, when it assumes a biennial mode. Flowering starts in early summer and is mostly finished by late summer after which the plant dies (Parsons and Cuthbertson, 2001).

Reproduction and dispersal. Reproduction occurs via seeds which, though having a relatively high viability rate, appear to survive for only 2-3 years in the soil (Parsons and Cuthbertson, 2001) but which may persist for longer (Moser and Crisp, undated). Bees and possibly other insects are responsible for pollination. Dispersal occurs via a range of means. The seed heads break off easily and being spiny, may adhere to animals, tyres, fleece, bags. The plant can also break off at the base and spread seeds as a tumbleweed. Water dispersal is recorded and spread via contaminated agricultural produce, especially grain, and equipment, also occurs. Apart from the tumbleweed mechanism, wind dispersal is not thought to be important because the seeds, being without a pappus, are not adapted to this form of travel (Parsons and Cuthbertson, 2001) (Moser and Crisp, undated).

Hybridisation. There is limited information about hybridisation of *C. calcitrapa*.

Competition. In the USA *C. calcitrapa* is described as an aggressive competitor because its climatic adaptability and rapid reproduction allows it to dominate native plants in many range land systems. Its spininess makes it unpalatable and so it is rarely grazed (Graham, University of Nevada website). However in Australia, *C. calcitrapa* is observed to have become less weedy than it was in the earlier years of European settlement, possibly due to an increase in soil fertility in farmed areas. Parsons and Cuthbertson (2001) note that it is mostly restricted to roadsides in most parts of its southern Australian range, apart from in NSW where it is still considered an important weed. Surveys in Iraq indicate it is amongst the 11 most serious weeds of wheat (Faris et al., 1989).

Harmful properties: Sharp, long, numerous and persistent spines may cause physical injury to animals and people. *C. calcitrapa* is not well known as a toxic plant however it has been described as poisonous to cattle (Ratera, 1981).

Economic benefit: *C. calcitrapa* has little economic benefit although it is still used for culinary and medicinal purposes in various European communities (Parsons and Cuthbertson, 2001). It is also being investigated for its ability to assist cheese ripening (Reis et al., 2000).

2. Weed Risk

World weed status

C. calcitrapa is considered a significant weed in parts of the USA where it is regulated in at least 6 states (USDA Invaders database). It is also a serious weed of wheat crops in Iraq (Faris et al., 1989).

Australian weed status

C. calcitrapa is naturalised in all Australian mainland States and Territories except the Northern Territory and Tasmania (Parsons and Cuthbertson, 2001). It is regulated in NSW and Victoria and

is permitted entry to Australia. Groves et al. (2003) list it as a major weed in more than four Australian locations.

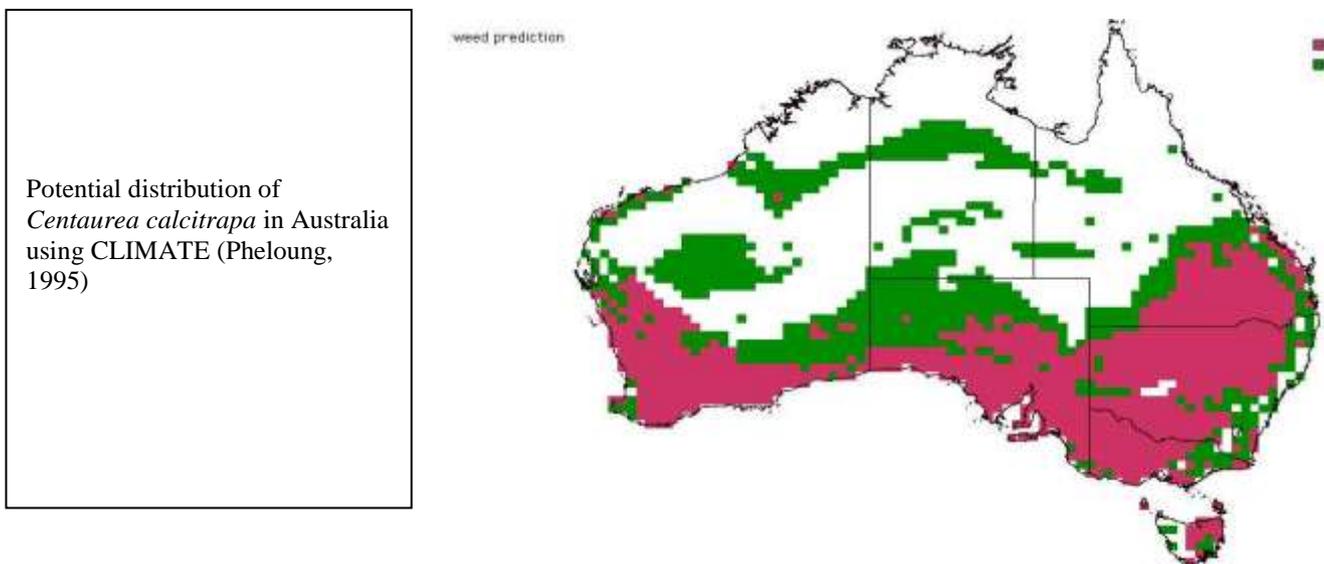
Weed potential in Tasmania.

C. calcitrapa is naturalised in Tasmania (since when) but its distribution is relatively limited. Plants have been recorded around Oatlands and Sheffield. FIX – no records since 1899 and 1947.

Climate matching indicates the plant is likely to grow well in a range of Tasmanian environments, The following analyses indicate the weed potential of *C. calcitrapa* in Tasmania is significant.

Weed risk assessment

Weed risk assessment undertaken by DPIWE involves use of a point scoring system devised by Pheloung (1996). *C. calcitrapa* scores 15 on a scale that is positively correlated to weediness. The nominal score for rejection of a plant on this scale is 7 or greater (see Appendix 1 for risk assessment scoring).



3. Weed Impact Assessment

Weed impact assessment is based on the DPIWE scoring system designed for that purpose. *C. calcitrapa* scores 4 points on a scale where 4 points or more indicates a plant has significant potential impact. The impact scoring system requires that questions be answered with a particular land use and density in mind. *C. calcitrapa* was assessed for its potential impacts upon agriculture at moderate densities.

Economic impact. The economic impact of *C. calcitrapa* in Tasmania is mostly relevant to agricultural situations.

Environmental impact: *C. calcitrapa* is unlikely to have a significant environmental impact although in Tasmania although reports of incursions into native vegetation in the USA raise some doubt. Groves et al. (2003) list this plant as primarily a weed of agriculture or a ruderal weed.

Social impact. *C. calcitrapa* is unlikely to have significant social impacts in Tasmania.

4. Management Feasibility.

Since this plant is not naturalised in Tasmania at this time, management feasibility is not an issue. However, maintaining freedom from *C. calcitrapa* is highly dependent upon effective import prohibition, early detection and reporting of any occurrences and, community and industry education.

5. Declaration Recommendation.

C. calcitrapa appears to have potential to establish, reach moderate densities and cause significant harm to grazing enterprises in Tasmania. Therefore it should be nominated for declaration under the *Weed Management Act 1999*. This will support import prohibition and eradication of existing infestations at the earliest convenience.

6. References.

Faris, Y.S., Husain, A.A., Kamel, N.M. and Tarir, N.T., 1989, Taxonomic study on distributed weeds and their control by some selective herbicides in wheat fields in Erbil. *Zarco* 2 (4) : 79-81.

Graham, J. and Johnson, W.S., (undated) *Managing purple and Iberian star thistles*. University of Nevada Cooperative Extension. Fact Sheet FS-03-46. Link from www.invasivespecies.gov/profiles/pst.shtml.

Groves, R.H. (Convenor), Hosking, J.R., Batianoff, G.N., Cooke, D.A., Cowie, I.D., Johnson, R.W., Keighery, G.J., Lepschi, B.J., Mitchell, A.A., Moerkerk, M., Randall, R.P., Rozefelds, A.C., Walsh, N.G. and Waterhouse, B.M., 2003, *Weed categories for natural and agricultural ecosystem management*. Bureau of Rural Sciences, Canberra.

Invaders database system of the University of Montana-Missoula at <http://invader.dbs.umt.edu>

Parsons, W. T. and Cuthbertson, E.G., 2001, *Noxious Weeds of Australia. Second Edition*. CSIRO Publishing, Collingwood, Melbourne.

Pheloung, P.C., 1995, *Determining the weed potential of new plant introductions to Australia*. A report commissioned by the Australian Weeds Committee. Agriculture Western Australia.

Pheloung, P.C., 1996, *Climate. A system to predict the distribution of an organism based on climate preference*. Agriculture Western Australia.

Ratera, E.L., 1981, Toxic plants and 'suspects' to cattle in the Los Alamos farm. *Revista de Ciencias Agrarias, Universidad Catolica Argentina* 2 (3/4): 39-40.

Reis, P.M., Lourenco, P.L., Domingos, A., Clemente, A.F., Pais, M.S and Malcata, F.X., 2000, Applicability of extracts from *Centaurea calcitrapa* in ripening of bovine cheese. *International Dairy Journal* 10 (11): 775-780.

USDA Plants Database at <http://plants.usda.gov>

USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN), online database at www.ars.grin.gov/cgi-bin/ngps/html, National Germplasm Resources Laboratory, Beltsville, Maryland.

Weeds Australia Database at www.weeds.org.au